How Do Washington's Pavements Compare Nationally?

The Federal Highway Administration (FHWA) publishes an annual report entitled Highway Statistics. Included in this report is information concerning pavement smoothness in each of the 50 states and the District of Columbia based on roughness* only. To the right is a snapshot of the ranking table that shows the number of miles, by state, in poor condition according to smoothness. The total miles reported includes the interstate system and principal arterials owned by the state, cities, and counties, and a sampling of other functional classes. Washington state is ranked 17th in smooth roads (Washington was ranked 10th in 2000). This change reflects an increase of 80 miles of the total pavement rated as "rough" (from 131 miles in 2000 to 211 miles in 2001).

This publication can be viewed at *www.fhwa.dot.gov/ohim/hs01/index.htm*

** This rating is based only on the International Roughness Index (IRI). In contrast, WSDOT measures pavement performance using all three ratings: pavement structural condition, rutting, and roughness.*

Pavement Smoothness by State

Source: Highway Statistics 2001, U.S. Department of Transportation.

Rank	*State*	*Centerline Miles Reported*	*Miles Poor Condition*	*Percent in Poor Condition*
1	Georgia	11,297	10	0.1%
2	Wyoming	4,417	23	0.5%
3	Alabama	7,706	43	0.6%
4	Nevada	2,954	32	1.1%
5	North Dakota	6,177	90	1.5%
6	Kentucky	5,192	90	1.7%
7	Florida	10,931	192	1.8%
8	Minnesota	11,673	238	2.0%
9	Kansas	8,830	217	2.5%
10	Montana	6,925	177	2.6%
11	Maine	2,390	66	2.8%
12	Idaho	3,842	107	2.8%
13	South Carolina	6,768	195	2.9%
14	Arizona	3,875	127	3.3%
15	Tennessee	7,717	258	3.3%
16	Oregon	6,291	240	3.8%
17	**Washington**	**5,396**	**211**	**3.9%**
18	Indiana	6,360	270	4.2%
19	Ohio	9,012	423	4.7%
20	New Hampshire	1,384	66	4.8%
49	California	20,416	5,338	26.1%
50	Massachusetts	3,298	998	30.3%

Source: Highway Statistics 2001, U.S. Department of Transportation

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Washington State Department of Transportation

0310-0294

Asset Management: Pavement Assessment

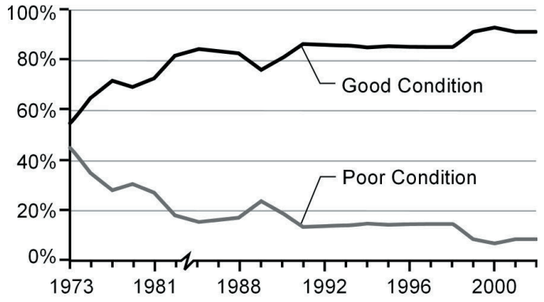
October 2003

Pavement Performance

WSDOT manages close to 18,000 lane miles of pavement surface. The goal for pavement is zero miles in "poor" condition. However, marginally good pavements may deteriorate into poor condition during the lag time between assessment and actual rehabilitation. As a result, a small percentage of marginally good pavements will move into the "poor" conditions category for any given assessment period. The annual review also provides the basis for determining the extent of pavement "due" for rehabilitation under the LLCC methodology.

Pavement Condition Trends

Percent of Pavements



Pavement conditions are grouped into five rating categories. For this chart, "Poor" includes "poor" and "very poor." "Good" includes "fair," "good" and "very good."

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Determining Pavements "Due" for Rehabilitation

WSDOT has been rating pavement condition since 1969. Pavement rated in good condition is smooth and free of defects. Pavement in poor condition is characterized by cracking, patching, roughness, and rutting. In a recent performance review FHWA stated that "WSDOT has an efficient data collection program using laser technology that provided high quality measurements for all road segments." Pavements are rated on pavement structural condition (PSC), rutting, and roughness (see below). WSDOT uses a combination of pavement ratings to determine when pavement is due for rehabilitation based on Lowest Life Cycle Cost (LLCC) management. If rehabilitation is done too early, pavement life is wasted. If rehabilitation is done too late, additional – and possibly very costly – repair work may be required if the underlying surface structure is compromised.

Pavement Structural Condition (PSC)

A pavement will develop structural deficiencies (for example, cracking) for two reasons: truck traffic and cold weather. The PSC is a measure based on distresses, such as cracking and patching, which are related to the pavement's ability to carry loads. PSC ranges from 100 (best condition) to 0 (worst condition). A roadway should be considered for rehabilitation when it falls within the PSC range of 40 to 60.

Rutting

Rutting is caused by heavy truck traffic or studded tire wear. Ruts deeper than 1/2 inch have the potential to hold water, increasing the risk of hydroplaning for high-speed traffic. A roadway should be rehabilitated when the rut depth is greater than 1/3 inch.

Roughness

The International Roughness Index (IRI) is a procedure to measure pavement ride. A full-sized van, with a laser-measuring device mounted on the front bumper, measures the roughness of the pavement. A roadway should be rehabilitated when the IRI value is between 170 and 220 inches per mile. WSDOT currently uses five categories for classifying pavement condition. For IRI these categories include very good *(IRI < 95 in/mi)*; good *(IRI 95-170 in/mi)*; fair *(170-220 in/mi)*; poor *(220-320 in/mi)*; and very poor *(> 320 in/mi)*.

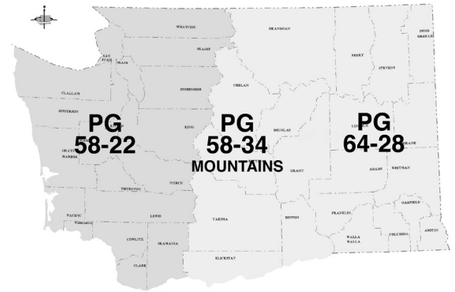
SuperPave

SuperPave, an acronym for Superior Performing Asphalt Pavements, was developed through a national cooperative effort with the Strategic Highway Research Program (SHRP). One of the objectives of the SHRP research was to develop an improved hot mix asphalt (HMA) design procedure. With the SuperPave mix design you get longer pavement life, lower life cycle cost and improved pavement condition.

SuperPave allows the designer to design the mix for the specific weather and traffic conditions at the project site. The relationship between asphalt binder, aggregate structure and volumetric properties are optimized with this design. The previous mix design method used by WSDOT (and others) was more empirical and less scientific.

A new performance grade (PG) system for asphalt binders was developed for SuperPave. The PG grade consists of two temperatures; the first is the maximum pavement temperature (in degrees Celsius) and is to prevent rutting, the second is the minimum pavement temperature and is to prevent thermal cracking. In Eastern Washington the base grade of PG 64-28 is designed for a maximum pavement temperature in the summer of 64°C and a minimum pavement temperature in the winter of minus 28°C.

Performance Grade (PG) Asphalt Binder Base Grades for WSDOT SuperPave Mixes



WSDOT placed its first SuperPave project in 1997 and has placed an increasing number of SuperPave projects each year. Through 2003 there have been well over 100 projects and 2 million tons of SuperPave placed on WSDOT projects. Full implementation of SuperPave will occur with the 2004 Standard Specifications.

SuperPave is performing well in terms of pavement structural condition, smoothness, and rutting. A comparison of SuperPave and conventional HMA showed that typically the SuperPave sections have less cracking and patching and are smoother.

Initially the bid price of SuperPave was approximately 30% more than conventional HMA. Currently the overall cost for SuperPave and conventional HMA in Washington State is about the same.

Hot Mix Asphalt Pavement Delivery

A measurement of the delivery of the highway construction program is the award of hot mix asphalt (HMA). Formerly Asphalt Concrete Pavement (ACP)

In October 2002, WSDOT forecasted that 1,417,126 tons of HMA would be awarded throughout the State from October 2002 through September 2003. The final tally of 1,825,442 HMA tons awarded was 408,316 tons over the original forecast. This increase was substantially the result of the "Nickel Funding Package" passed by the 2003 Washington State Legislature. WSDOT awarded five projects from the nickel funding package with a combined total of 315,285 tons of HMA.

As can be seen on the attached chart the number of tons of HMA awarded lagged behind the forecast amount for the first nine months. This lag in tons awarded was typically the result of projects being advertised late in the quarter and advertisement periods being extended to accommodate contract addendums. By August of 2003 the awarded tons, adjusted for the added nickel projects, had surpassed the forecast tons.

Hot Mix Asphalt Pavement in Tons
October 2002 through September